Mr. Steve Simko
BP Amoco Oil - Whiting Refinery
2815 Indianapolis Avenue
Whiting, Indiana 46394

Re: Minor Source Modification No.:
089-11984-00003

Dear Mr. Simko:

BP Amoco Oil - Whiting Refinery applied for a Part 70 operating permit on October 15, 1996 for its oil refinery operations. An application to evaluate VOC emission reduction credits from the shutdown of the Lubes Unit at the source was received on August 23, 1999 and January 10, 2000. Pursuant to 326 IAC 2-7-10.5, the VOC emission reduction credits from the shutdown of the Lubes Unit are approved for banking in accordance with 326 IAC 2-3-4.

The proposed Minor Source Modification approval will be incorporated into the pending Part 70 permit application pursuant to 326 IAC 2-7-10.5(l)(3). The source may begin operation upon issuance of the source modification approval.

This decision is subject to the Indiana Administrative Orders and Procedures Act - IC 4-21.5-3-5. If you have any questions on this matter call (800) 451-6027, press 0 and ask for Ms. Michele M. Williams or ask for extension 3-0863, or dial (317) 233-0863.

Sincerely,

Paul Dubenetzky, Chief
Permits Branch
Office of Air Management

Attachments
MMW

cc: File - Lake County
U.S. EPA, Region V
Air Compliance Section Inspector - Rick Massoels
IDEM Northwest Regional Office
Permit Tracking - Janet Mobley
Compliance Data Section - Karen Nowak
Administrative and Development - Janet Mobley
Technical Support and Modeling - Michele Boner

# PART 70 MINOR SOURCE MODIFICATION
# OFFICE OF AIR MANAGEMENT

## BP Amoco Oil - Whiting Refinery
## 2815 Indianapolis Boulevard
## Whiting, Indiana 46394

(herein known as the Permittee) is hereby authorized to construct and operate subject to the conditions contained herein, the emission units described in Section A (Source Summary) of this approval.

This approval is issued in accordance with 326 IAC 2 and 40 CFR Part 70 Appendix A and contains the conditions and provisions specified in 326 IAC 2-7 as required by 42 U.S.C. 7401, et. seq. (Clean Air Act as amended by the 1990 Clean Air Act Amendments), 40 CFR Part 70.6, IC 13-15 and IC 13-17.

| | |
|---|---|
| Source Modification No.: 089-11984-00003 | |
| Issued by:<br>Paul Dubenetzky, Branch Chief<br>Office of Air Management | Issuance Date: |

## SECTION A SOURCE SUMMARY

This approval is based on information requested by the Indiana Department of Environmental Management (IDEM), Office of Air Management (OAM). The information describing the emission units contained in conditions A.1 through A.2 is descriptive information and does not constitute enforceable conditions. However, the Permittee should be aware that a physical change or a change in the method of operation that may render this descriptive information obsolete or inaccurate may trigger requirements for the Permittee to obtain additional permits or seek modification of this approval pursuant to 326 IAC 2, or change other applicable requirements presented in the permit application.

### A.1 General Information [326 IAC 2-7-4(c)] [326 IAC 2-7-5(15)]

The Permittee owns and operates an oil refinery.

| | |
|---|---|
| Responsible Official: | BP Amoco Oil - Whiting Refinery |
| Source Address: | 2815 Indianapolis Boulevard, Whiting, Indiana 46394 |
| Mailing Address: | 2815 Indianapolis Boulevard, PO Box 710, Whiting, Indiana 46394-0710 |
| SIC Code: | 2911 |
| County Location: | Lake |
| County Status: | Nonattainment for Ozone (VOC and NOx), $PM_{10}$, and SO2<br>Attainment for PM, $NO_2$, and CO |
| Source Status: | Part 70 Permit Program<br>Major Source, under PSD and Emission Offset Rules<br>Major Source, Section 112 of the Clean Air Act |

### A.2 Emission Unit Shutdown Summary [326 IAC 2-7-4(c)(3)] [326 IAC 2-7-5(15)]

This stationary source shutdown the following facilities of the Lubes Unit in December of 1998:

(a) No. 37 Pipe Still;
(b) Heater to No. 37 Pipe Still;
(c) Solvent Extraction Unit (NMP);
(d) Heaters to Solvent Extraction Unit;
(e) Methyl Ethyl Ketone (MEK) Dewaxing Unit;
(f) Hydro Finishing (HiFi) Lubes Unit;
(g) Grease Works Unit;
(h) Heavy Oils; and
(i) Heaters to the Grease Works Unit.

**SECTION D.1 FACILITY OPERATION CONDITIONS**

Facility Description [326 IAC 2-7-5(15)]

This stationary source shutdown the following equipment of the Lubes Unit in December of 1998:

(a) No. 37 Pipe Still;
(b) Heater to No. 37 Pipe Still;
(c) Solvent Extraction Unit (NMP);
(d) Heaters to Solvent Extraction Unit;
(e) Methyl Ethyl Ketone (MEK) Dewaxing Unit;
(f) Hydro Finishing (HiFi) Lubes Unit;
(g) Grease Works Unit;
(h) Heavy Oils; and
(i) Heaters to the Grease Works Unit.

D.1.1 Permanent Shutdown of Equipment

The equipment associated with the Lubes Unit shall be permanently shutdown and taken out of service to validate available emission reduction credits.

D.1.2 Volatile Organic Compound (VOC) Emission Reduction Credits

(a) Pursuant to 326 IAC 2-3-4, the following table identifies the emission reduction credits from the shutdown of the Lubes Unit:

| Lubes Unit Equipment | Operation Permit No. | VOC ERCs* (tons/year) |
|---|---|---|
| No. 37 Pipe Still | 45-08-93-0569 | 67.4 |
| Heater to No. 37 Pipe Still | 45-08-93-0563 | 0.94 |
| Solvent Extraction Unit (NMP) | 45-08-93-0569 | 59.8 |
| Heaters to Solvent Extraction Unit | 45-08-93-0564<br>45-08-93-0565 | 1.08 |
| Methyl Ethyl Ketone (MEK) Dewaxing Unit | 45-08-93-0569 | 394 |
| Hydro Finishing (HiFi) Lubes Unit | 45-08-93-0569 | 61.0 |
| Grease Works Unit | 45-08-93-0569 | 56.1 |
| Heavy Oils | 45-08-93-0570 | 0 |
| Heaters to the Grease Works Unit | 45-08-93-0564 | 0 |
| Available VOC Emission Reduction Credits (tons/yr): | | 640 |

* The VOC ERCs are based on actual emissions from the most recent representative 2-year baseline period (1997 and 1998).

The OAM shall allow these emission reduction credits in the amount of 640 tons to be used under the preconstruction review program because these emissions have not been relied

upon in the control strategy submitted to EPA to demonstrate attainment and maintenance of ambient air quality standards.

(b) A portion of the VOC emission reduction credits from the shutdown of the Lubes Unit in the amount of 382 tons has been transferred to Whiting Clean Energy (089-11194-00449).

(c) The remaining VOC emission reduction credits available from the shutdown of the Lubes Unit is 258 tons.

(d) In accordance with 326 IAC 2-3-4, these emission reduction credits are valid:

(1) As long as the credits are relied upon by the end of December 2003, plus time for construction;

(2) Does not interfere with the attainment and maintenance of ambient air quality standards; and

(3) Does not violate any other condition set forth in 326 IAC 2-3.

# Indiana Department of Environmental Management
# Office of Air Management

## Technical Support Document (TSD) for Emission Reduction Credits

**Source Background and Description**

| | |
|---|---|
| Source Name: | BP Amoco Oil - Whiting Refinery |
| Source Location: | 2815 Indianapolis Avenue, Whiting, Indiana 46394 |
| County: | Lake |
| Construction Permit No.: | CP-089-11984-00003 |
| SIC Code: | 2911 |
| Permit Reviewer: | Michele M. Williams |

The Office of Air Management (OAM) has performed the following VOC emission reduction credit review for the shutdown of the Lubes Unit at the BP Amoco Oil - Whiting Refinery located in Whiting, Indiana. The emissions from the Lubes Unit consist of fugitive and point sources of emissions. Because Amoco is one of the 28 listed categories, the fugitive emissions can be used as emission reduction credits because fugitives must be counted toward PSD applicability.

The entire Lubes Unit, identified in Operation Permit Nos. 45-08-93-0563, 45-08-93-0564, 45-08-93-0565, 45-08-93-0569, and 45-08-93-0570 stopped operations in December of 1998. To determine the amount of available emission reduction credits, actual emissions from the most recent representative 2-year baseline period are used. The most recent available data from the Lubes Unit at the Amoco facility is 1997 and 1998. Since the component equipment did not change in 1997 and 1998, the annual emission calculations from the component equipment leaks are the same. The following summary table represents the available emission reduction credits from the equipment associated with the Lubes Unit:

| Lubes Unit Equipment | Operation Permit No. | Total VOC ERCs from Equipment (tons/year) |
|---|---|---|
| No. 37 Pipe Still | 45-08-93-0569 | 67.4 |
| Heater to No. 37 Pipe Still | 45-08-93-0563 | 0.94 |
| Solvent Extraction Unit (NMP) | 45-08-93-0569 | 59.8 |
| Heaters to Solvent Extraction Unit | 45-08-93-0564<br>45-08-93-0565 | 1.08 |
| Methyl Ethyl Ketone (MEK) Dewax Unit | 45-08-93-0569 | 394 |
| Hydro Finishing (HiFi) Lubes Unit | 45-08-93-0569 | 61.0 |
| Heavy Oils | 45-08-93-0570 | 0 |
| Grease Works Unit | 45-08-93-0569 | 56.1 |
| Heaters to the Grease Works Unit | 45-08-93-0564 | 0 |
| Available VOC Emission Reduction Credits (tons/yr): | | 640 |

Amoco is required under 326 IAC 2-6 to annually submit an emission statement of actual emissions from

its source. Traditionally, the annual emission statements are used to quantify actual emissions for netting and emission offset projects. However, the annual emission statements from Amoco identified all fugitive sources as one emission point. Therefore, the OAM accepted the data from the Toxic Chemical Release Inventory (TRI) required under the Emergency Planning Community Right-to-Know Act (EPCRA) to quantify actual emissions from each of the fugitive sources.

The TRI data was calculated using source specific testing data. The *Protocol for Equipment Leak Emission Estimates,* an EPA guidance document, was used to develop the source specific testing data. Upon review, the OAM accepted the source specific testing data. The emission data is included in Attachment 1-A.

The emissions from each of the heaters of the Lubes Unit were calculated using EPA AP-42 emission factors. The annual emission statements were used to quantify the actual emissions from the heaters of the Lubes Unit. The emission calculations are included in Attachment 1-A.

**Transfer of VOC Emission Reduction Credits**

Amoco has requested that a portion of the available VOC emission reduction credits be transferred to Whiting Clean Energy (WCE) (Construction Permit No. 089-11194-00449). The following table outlines the amount and location of these VOC emission reduction credits:

| Lubes Unit Equipment | Operation Permit No. | Total VOC ERCs from Equipment (tons/year) | Total VOC ERCs sold to WCE (tons/year) |
|---|---|---|---|
| No. 37 Pipe Still | 45-08-93-0569 | 67.4 | 67.4 |
| Heater to No. 37 Pipe Still | 45-08-93-0563 | 0.94 | 0.94 |
| Solvent Extraction Unit (NMP) | 45-08-93-0569 | 59.8 | 59.8 |
| Heaters to Solvent Extraction Unit | 45-08-93-0564<br>45-08-93-0565 | 1.08 | 1.08 |
| Methyl Ethyl Ketone (MEK) Dewaxing Unit | 45-08-93-0569 | 394 | 182 |
| Hydro Finishing (HiFi) Lubes Unit | 45-08-93-0569 | 61.0 | 61.0 |
| Heavy Oils | 45-08-93-0570 | 0 | 0 |
| Grease Works Unit | 45-08-93-0569 | 56.1 | 9.8 |
| Heaters to the Grease Works Unit | 45-08-93-0564 | 0 | 0 |
| Available VOC ERCs (tons/year): | | 640 | 382 |
| Required VOC ERCs for Whiting (tons/year): | | --- | 90.4 |
| Total Remaining VOC ERCs (tons/year): | | 258 (BP Amoco) | 291.6 (WCE) |

**Attachment 1-A**

**VOC Emission Calculations/VOC Emission Data for the Lubes Unit at BP Amoco Oil**

The lubes unit is made up of both fugitive sources and point sources of emissions. The point sources include all of the heater components associated with the Lubes Unit. The fugitive sources include component equipment leaks from valves, compressors, and pumps at the Lubes Unit.

## A. Point Sources of VOC Emissions from the Lubes Unit

1. Heater to No. 37 Pipe Still
2. Heaters to Solvent Extration Unit (NMP)
3. Heaters to the Grease Works Unit - These heaters were not used in 1997/1998 according to the Emission Statement Reports

| Point Source | No. 37 Pipe Still Heater | NMP Heaters |
|---|---|---|
| Unit Size, MMBtu/hr | 108 | 147 |
| AP-42 VOC Emission Factor, lb/mmcf | 5.5 | 5.5 |
| 1997 Operation Usage, hrs/yr | 2150 | 1950 |
| 1997 VOC Emissions, tons/yr | 0.63 | 0.77 |
| 1998 Operation Usage, hrs/yr | 4250 | 3500 |
| 1998 VOC Emissions, tons/yr | 1.24 | 1.39 |
| Average VOC Emissions, tons/yr | 0.94 | 1.08 |

Methodology: EPA AP-42 Emission Factors are from Chapter 1.4, Table 1.4-2, Version 3/98

Actual Emissions (tons/yr) = Heat Input Rate (MMBtu/hr) x Emission Factor (lb/MMcf) x (MMcf/1020 MMBtu) x (ton/2000 lbs) x Actual Operation (hrs/yr)

**B. Fugitive Sources of VOC Emissions from the Lubes Unit**

The component equipment did not change in 1997 and 1998, therefore, the annual emission calculations from the component equipment leaks are the same.

| Fugitive Source | VOC Emissions (tons/year) | Emission Factor Sources |
|---|---|---|
| No. 37 Pipe Still Equipment: | | |
| H2-37 PS | 6.01 | |
| HVGO-37 PS | 13.4 | 1995 Protocol for Equipment Leak Emission |
| NMP-37 PS | 13.4 | Estimates and Leak Detection and Repair (LDAR) |
| Propane REFR-37 PS | 7.84 | Program |
| Raffinate-37 PS | 13.4 | |
| White-37 PS | 13.4 | |
| Solvent Extration Unit (NMP) Equipment: | | |
| H2-NMP | 6.23 | 1995 Protocol for Equipment Leak Emission |
| HVGO-NMP | 13.4 | Estimates and Leak Detection and Repair (LDAR) |
| NMP-NMP | 13.4 | Program |
| Raffinate-NMP | 13.4 | |
| White-NMP | 13.4 | |
| MEK Dewaxing Unit Equipment: | | GC Testing Analysis for Tank Estimates |
| Tank | 12.6 | Mass Balance Calculations for Fugitive Losses |
| Fugitive Losses | 381 | |
| Hydro Finishing (HiFi) Lube Equipment: | | |
| H2-HiFi | 5.94 | 1995 Protocol for Equipment Leak Emission |
| NMP-HiFi | 14.5 | Estimates and Leak Detection and Repair (LDAR) |
| Propane REFR-HiFi | 8.22 | Program |
| Raffinate-HiFi | 14.8 | |
| White-HiFi | 17.5 | |
| Grease Works Unit Equipment: | | |
| H2-Grease | 8.14 | 1995 Protocol for Equipment Leak Emission |
| HVGO-Grease | 13.4 | Estimates and Leak Detection and Repair (LDAR) |
| Propane REFR-Grease | 7.82 | Program |
| Raffinate-Grease | 13.4 | |
| White-Grease | 13.4 | |
| Total Emissions: | 638 | |

**1. Emission Factor Calculations**

**(a) Leak Detection and Repair Program and 1995 Protocol for Equipment Leak Emission Estimates**

The average emission factors are developed in accordance with the *1995 Protocol for Equipment Leak Emission Estimates* (US EPA, November 1995 Document, EPA-453-/R-95-017) using the results of the Leak Detection and Repair (LDAR) inspections which are conducted in accordance with Method 21, contained in 40 CFR 60. The Lubes Unit was required to conduct annual LDAR inspections to demonstrate compliance with 40 CFR 63, 40 CFR 61, and 326 IAC 8-4-8.

A leak is defined by an instrument reading of 10,000 ppm or greater for valves or pumps in HAP service. Pressure relief valves must be operated such that a reading of less than 500 ppm above background levels is attained. The leak definition is defined as an instrument reading of greater than 500 ppm above background for closed vent systems. A pump, compressor, or valve designated for no detectable emission is defined as an instrument reading of less than 500 ppm above background (40 CFR 60.485(b) and © and 60.482-2(e), 60.482-3(l), and 60.482-7(f)). The LDAR results are compiled quarterly and semi-annually per the appropriate regulation and in general include the following information: the number of components tested, the number of components found leaking, and the type of service in which each component operates (vapor or light liquid).

The results of the LDAR inspections are then analyzed in accordance with the *1995 Protocol for Equipment Leak Emission Estimates* to determine the average emission factor. Section 2.2.2.4 of the 1995 Protocol (page 2-9) defines the following equation to calculate the average emission factor:

Average Factor = $(F \times RLF) + [(1-F) \times RNLF]$

Where:
- F = Fraction of sources greater than/equal to 10,000 ppmv, i.e. leaking components
- RLF = Refinery leaking emission factor
- RNLF = Refinery non-leaking factor

To determine the RLF and RNLF, BP Amoco analyzed Section 2.3.3 of the 1995 Protocol - EPA Correlation Approach. Correlations can be used to estimate emissions for the entire range f non-zero screening values. This approach involves entering the non-zero, non-pegged screening value into the correlation equation to determine the TOC mass emission rate. All components that have been deemed non-leaking during the inspection are assigned default-zero emission rates consistent with Table 2-12 (page 2-34). In addition, this approach also provides a method for using 'pegged' emission rates for screening values beyond the upper limit measured by the portable screening device. As discussed above, a leak is defined as an emission rate greater than 10,000 ppmv which also corresonds to the upper detection limit on the portable screening device. Therefore, all components that are defined as 'leaking' are assigned a pegged emission rate consistent with Table 2-14 of the protocol. However, when a leaking valve is found, it is unknown how long it has been leaking for as it has been 12 months since its previous inspection. BP Amoco therefore takes a conservative approach by assuming that all leaking valves have leaked for 6 of the 12 months.

Finally, BP Amoco occasionally defers repairs on pumps and valves until a turnaround for that source resulting in continuous emissions from that component. These components are reported to IDEM per the regulations. The resulting equation for the average, site-specific VOC emission factors for BP Amoco is:

$$\text{Average Factor} = \frac{(L \times PRLF) / 2 + [(N - L) \times RNLF] + (D \times PRLF)}{N}$$

Where:
- L = Number Components greater than/equal to 10,000 ppmv, i.e. leaking components
- PRLF = Pegged refinery leaking emission factor (Table 2-14)
- N = Total number of components screened, i.e. leaking and non-leaking
- RNLF = Refinery non-leaking factor (Table 2-12)
- D = Number components whose repair has been deferred until turnaround

**(b) Mass Balance Calculations for the Fugitive VOC Losses from MEK Dewaxing Unit**

**(i) Material Usage**

| Material | 1997 Usage | | | 1998 Usage | | |
|---|---|---|---|---|---|---|
| | gal/yr | gal/day | lbs/yr | gal/yr | gal/day | lbs/yr |
| MEK | 78000 | 214 | 538980 | 138000 | 378 | 953580 |
| Toluene | 52000 | 142 | 359320 | 75000 | 205 | 518250 |
| Totals | 130000 | 356 | 898300 | 213000 | 583 | 1471830 |

Methodology:

Material Usage, lbs/yr = Material Usage (gal/yr) x Density (6.91 lb/gal)

**(ii) Tank and Vent Losses**

| Material | 1997and 1998 Point Source Losses | | | | |
|---|---|---|---|---|---|
| | Tanks | | | Vents | |
| | gal/day | gal/yr | lbs/yr | gal/day | gal/yr |
| MEK | 6.16 | 2248 | 15534 | 24.6 | 8979 |
| Toluene | 3.84 | 1402 | 9688 | 15.4 | 5621 |
| Totals: | 10 | 3650 | **25222 (12.6 tons/yr)** | 40 | 14600 |

Methodology:

Of the total VOC losses from tanks and vents, MEK makes up 61.55% and Toluene makes up 38.35%.

Tank Emissions, lbs/yr = Tank Emissions, gal/day x 365 day/yr x Density, 6.91 lb/gal

Gas Chromatography testing was conducted on the tank to estimate emission losses.

The emission losses from the vents were not included as available emission reduction credits because these emissions were subject to the MACT requirements.

**(iii) Fugitive Losses**

| Material | 1997 Nonpoint Source Losses | | | | | |
|---|---|---|---|---|---|---|
| | VOC Losses to Product | | VOC Losses to Water | | VOC Losses as Fugitives | |
| | % Loss | gal/day | % Loss | gal/day | gal/day | lb/yr |
| MEK | 6.16 | 32.9 | 9.23 | 21.9 | 134 | 336867 |
| Toluene | 3.84 | 20.5 | 5.77 | 13.7 | 83 | 209892 |
| Totals: | 10 | 53.4 | 15 | 35.6 | 217 | 546759 |

| Material | 1997 Nonpoint Source Losses | | | | | |
|---|---|---|---|---|---|---|
| | VOC Losses to Product | | VOC Losses to Water | | VOC Losses as Fugitives | |
| | % Loss | gal/day | % Loss | gal/day | gal/day | lb/yr |
| MEK | 6.16 | 53.9 | 9.23 | 35.9 | 239 | 601859 |
| Toluene | 3.84 | 33.6 | 5.77 | 22.5 | 149 | 375001 |
| Totals: | 10 | 87.5 | 15 | 58.4 | 388 | 976860 |
| Average Total: | | | | | | **761810 (381 tons/yr)** |

Assumptions:

Water Losses = 10% to WWTP which is degraded
Product Losses = 15% to Lubes Products
Fugitive Losses = Remainder of Solvent (MEK + Toluene)

Methodology:

| | |
|---|---|
| Total VOC Loss-Water, gal/day = | Total Material Usage, gal/day x % VOC Loss to Water |
| Total VOC Loss-Product, gal/day = | Total Material Usage, gal/day x % VOC Loss to Product |
| Total VOC Loss-Fugitives, gal/day = | Total Matl Usage, gal/day - Total VOC Loss to Product, gal/day - Total VOC Losses to Water - Tank and Vent Losses, gal/day |
| Total VOC Loss-Fugitives, lb/yr = | Total VOC Loss-Fugitives, gal/day x Density, 6.91 lb/gal x 365 day/yr |
| Total MEK Loss-Fugitives, lb/yr = | Total VOC Loss-Fugitives, gal/day x Density, 6.91 lb/gal x 365 day/yr x 61.55% MEK |
| Total Toluene Loss-Fugitives, lb/yr = | Total VOC Loss-Fugitives, gal/day x Density, 6.91 lb/gal x 365 day/yr x 38.35% Toluene |